

Yamagata Med J 2014 ; 32 (1) : 36 – 39

Importance of dental assessment in the intensive care unit: two cases of accidental metal crown migration detected by daily routine chest roentgenograms.

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(Accepted October 17, 2013)

ABSTRACT

Aspiration or swallowing of foreign bodies is a rare incident in the intensive care unit (ICU). We herein report two cases of metal dental crown migration to the bronchus and esophagus in elderly patients that were both detected by daily routine chest roentgenograms in the ICU. Oral care is regularly provided for patients in our ICU. Dental assessment for all patients admitted to ICU should also be introduced to this setting.

Key words: dental assessment, intensive care unit, migration of foreign body, geriatric patient

Aspiration or swallowing of foreign bodies is a rare incident in the intensive care unit (ICU). However, it can occasionally lead to severe complications such as respiratory tract infections or esophageal mucosa injury leading to mediastinitis, the latter of which may require thoracotomy for removal of the foreign body. We present two cases of metal dental crown migration into the bronchus and the esophagus in geriatric patients, both of which were detected by daily routine chest roentgenograms in the ICU.

CASE REPORTS

Case 1

A 73-year-old man (158 cm, 47 kg) was transferred to the ICU after pancreaticoduodenectomy. He had a history of stroke five years previously, diabetes mellitus, and poor dentition with an unstable metal crown of the left mandibular canine. In the operating room, both tracheal intubation

and extubation were uneventful without any reported dental injury. He did not complain of a sore throat after extubation. There were no remarkable findings in his chest and abdominal roentgenograms in the immediate postoperative period. His peripheral arterial oxygen saturation

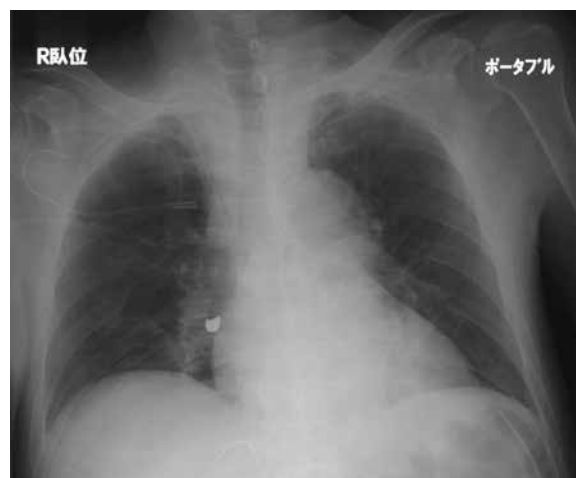


Fig. 1 Chest roentgenogram of case 1 demonstrating a metal crown located in the bronchus of inferior lobe of the right lung.

(SpO₂) was 99% with 6 L/min oxygen via facemask. Arterial blood gas analysis after extubation showed adequate ventilation and oxygenation (pH, 7.35; PO₂, 279 mmHg; and PCO₂, 43.4 mmHg). He experienced neither respiratory distress nor any desaturations overnight.

A chest roentgenogram on the morning of the first postoperative day in the ICU revealed a foreign body located in the right perihilar region (Fig. 1). Dental assessment revealed the unstable metal crown (Fig. 2, left) on the canine was missing. The crown had fallen into the bronchus of inferior lobe of the right lung. Removal of the crown using a flexible bronchoscope (Pentax bronchoscope FB-18RBS, HOYA Corporation, Japan) and a forceps was performed under local anesthesia at the patient's bedside. The patient was placed in a left lateral position with his head tilted during the procedure. No major bronchial injuries were noted including laceration, bleeding, or ulceration. We later confirmed the complete removal of crown with a chest roentgenogram.

Case 2

A 76-year-old man (164 cm, 67 kg) with severe respiratory acidosis (pH, 6.97; PO₂, 49.6 mmHg; and PCO₂, 147 mmHg on room air) was transferred to the ICU. He had initially been treated with 20 mg dantrolene twice daily in a medical ward prior to transfer to the ICU, as he had an elevated creatine kinase (CK) of 1648 IU/l with suspicion for neuroleptic malignant syndrome.

He had been intubated on the medical ward and was on mechanical ventilation for four days in

the ICU to recover from his CO₂ narcosis. He was weaned from ventilatory support and removal of his endotracheal tube was planned on the fifth day in ICU. Before extubation, however, a chest roentgenogram was taken and revealed a foreign body located in the left mediastinum (Fig. 3). Dental assessment revealed disappearance of a metal crown of the left mandibular molar (Fig. 2, right). We suspected that the crown migrated not into the bronchus but into the esophagus since his airway was protected in the ICU with a cuffed endotracheal tube. Bronchoscopy confirmed that his airway was clear. Prior to the removal of the migrated crown, his tracheal tube was removed since the gastroenterologist insisted that a flexible gastrointestinal endoscope was better manipulated without an endotracheal tube in place. Removal of the crown was performed under local anesthesia without sedation at the bedside. The crown was located at a depth of 35 cm from his incisor in the esophagus. There was no mucosal injury nor any redness or edema around the crown. The crown was successfully removed using a gastrointestinal endoscope (Olympus GIF Type XQ240, Olympus Corporation, Japan), a wide opening oblique distal attachment with rim (MAJ-295 Gage 1, Olympus Corporation, Japan) and a rat tooth and alligator jaw grasping forceps (FG-47L-1, Olympus Corporation, Japan) (Fig. 4).

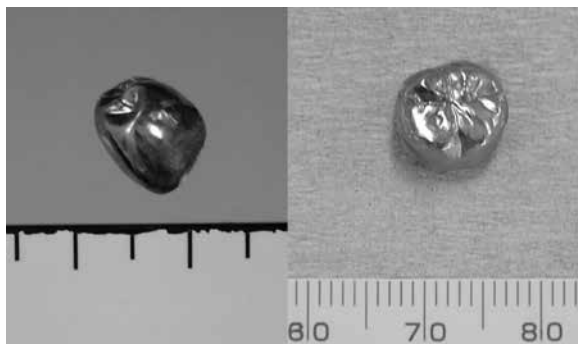


Fig. 2 The metal crowns of case 1 (left) and case 2 (right)



Fig. 3 Chest roentgenogram of case 2 demonstrating a metal crown located in the left mediastinum

DISCUSSION

The most important finding in the present cases is that migration of metal crowns can occur without patient awareness, complaint, or symptoms. In these two cases, the migrated crowns would have gone undetected initially had chest roentgenograms not been obtained. It is unclear exactly when the migration of the metal crowns occurred in both cases. However, we suspect that the migration occurred during the first night in the ICU in case 1 and between the fourth to the fifth day in the ICU in case 2. In case 1, both intubation and extubation were without event, and the patient was subsequently transferred to the ICU. In case 2, the chest roentgenogram taken on the fourth ICU day did not show the crown. In both cases, daily routine chest roentgenograms helped identify crown migration shortly after it occurred.

The precise study about the incidence of aspiration or swallowing of foreign bodies in ICU setting has not been reported as long as we investigated. Of 1292 patients who were transferred to the ICU in Yamagata Prefectural Shinjo Hospital from January 2007 to December 2012, four hundred patients (31%) were intubated and were on mechanical ventilation. There were three cases (0.23%) of aspiration or swallowing of foreign bodies during the same period.

The incidence of dental injury during intubation is reported to be 0.035 - 0.1%^{1, 2)}. Most dental injuries occur during direct laryngoscopy and tracheal intubation, particularly in cases of difficult intubation. In such cases, dental injury is usually recognized as soon as it happens. However, crown

dislocation and migration in our cases occurred after or during endotracheal tube placement without patient or physician awareness, suggesting that is critical to perform dental assessment not only during intubation and extubation but also over the ensuing days.

The probable cause of crown migration in the present cases was a lack of knowledge regarding each patient's dental status while in the ICU. Preventive measures could have been implemented had this knowledge been obtained upon initial evaluation. In case 1, a preoperative dental consultation could have been obtained given the patient's unstable dental crown, with possible preoperative extraction or application of a tooth protector. In case 2, we similarly did not have precise information regarding the patient's dental status, since he had been intubated prior to arrival in the ICU. We were later informed by the patient's family that his dental crown had previously been unstable.

Dental assessment of patients in the ICU is of utmost importance. In our own ICU, we will implement a dental check system using a simple dental examination introduced recently by Buffington³⁾ for all ICU patients. Anesthesiologists should routinely inform patients prior to anesthesia that dental injuries can occur, particularly in patients with unstable teeth. Detailed information regarding the dental status of patients must be shared with nursing staff in both the ICU and general wards. Non-surgical patients in the ICU with dentition problems are similarly at risk of aspiration or swallowing of teeth or crowns. Oral care has recently become routine in ICU patients, and a dental assessment should similarly become the norm.

Additionally, it is worth considering a baseline impairment of the upper airway reflex in elderly patients. Aspiration of foreign bodies is uncommon, but patients with such impairment are at increased risk. It is known that elderly patients have decreased sensitivity of upper airway reflexes⁴⁾ and furthermore that the laryngeal reflex remains dampened for several hours after prolonged tracheal intubation even after a patient recovers



Fig. 4

full consciousness from general anesthesia⁵⁾. It is also reported that patients with a history of basal ganglia stroke, such as the patient in case 1, have an impaired swallowing reflex and that aspiration occurs more frequently at night in such patients⁶⁾.

In conclusion, we have reported upon two cases of metal crown migration into the bronchus and the esophagus in elderly patients, which were identified on chest roentgenograms in the ICU. Dental injuries and aspiration or swallowing of teeth can occur occultly in the ICU. Routine dental assessment as well as diligent oral care should be introduced for all ICU patients.

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